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LISTS OF SPECIES

Mammalia, Didelphimorphia, Chiroptera, and Rodentia, Parque Nacional Chaco and Capitán Solari, Chaco Province, Argentina

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Abstract
We studied the small mammal assemblage (bats, marsupials and rodents) of *Parque Nacional Chaco* and Capitán Solari (Chaco Province, Argentina) based on captures and analysis of owl pellets. Twenty-one species were recorded during a brief survey, including two marsupials, seven bats, and twelve rodents. In addition, we documented the first occurrence of the bat *Lasiurus ega* in the Chaco Province, and extended to the southwest the distribution of the didelphid marsupial *Cryptonanus chacoensis* and the oryzomyine rodent *Oecomys* sp. We also provided a second occurrence site in the Humid Chaco for the cricetid rodents *Calomys laucha* and *Holochilus brasiliensis*. Identified taxa belonged to species that are typical of the Humid Chaco ecoregion of Argentina.

Introduction
In comparison with other areas of northern Argentina, the small mammal fauna of the Humid Chaco ecoregion is poorly known, both considering taxonomy and distribution (Galliari and Goin 1993). The Argentinean endemic marsupial *Chacodelphys formosa* (Shamel, 1930) and the cricetid rodent *Oecomys* sp. (*sensu* Cirignoli et al., 2006) are noteworthy examples of this situation. Both forms are known from only a few localities (<6; see Teta et al. (2006) and Pardiñas and Ramírez Llorens (2005) for a detail of the known distribution of *Chacodelphys formosa* and *Oecomys* sp., respectively), and their phylogenetic relationships within their respective families are unresolved (see Voss et al. (2005) for the case of *Chacodelphys formosa* and Pardiñas and Ramírez Llorens (2005) for *Oecomys* sp.).

Pardiñas and Teta (2005) summarized the available information for cricetid rodents in the Humid Chaco of eastern Formosa Province, and discussed some taxonomic and biogeographic issues related to this group. Available data for the Chaco Province correspond mostly to isolated records from occasional samplings (e.g., Contreras and Berry 1983; Kravetz et al. 1986; Barquez and Ojeda 1992), owl pellets analysis (e.g., Massoia et al. 1995; Pardiñas et al. 2004; Jayat et al. 2006), or unreliable mammal lists that did not indicate where vouchers were deposited (Heinonen Fortabat and Chebez 1997). Here we present the results of a small mammal inventory conducted in *Parque Nacional Chaco* and the adjoining locality of Capitán Solari, increasing the knowledge on this group for the Eastern Chacoan region.

Materials and methods
Study site
Parque Nacional Chaco (26°45'35" - 26°53'40" S, 59°36'14" - 59°42'55" W; 14,981 ha is located in the Chaco Province, Departments of Sargento Cabral and Presidencia de la Plaza (Figure 1). Capitán Solari is a small village located 4.2 km east to this protected area (26°48'12" S, 59°33'28" W; Figure 1). The dominant landscape in the area is a mosaic of forests, marshes, lagoons, scrublands, and savannas. The Rio Negro

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separates the northeast edge of *Parque Nacional Chaco*, and this river is surrounded by dense gallery forests. The area is characterized by a subtropical climate, without a marked dry season and a mean annual rainfall of 1,328 mm (Cabrera 1976).

Data collection

Rodent and marsupial trapping was conducted during July 2006 (total sampling effort = 1,048 traps-nights). Ten trap lines with 12 (n = 2), 20 (n = 1), 24 (n =2) or 25 (n = 4) Sherman live traps baited with a mixture of peanut butter, animal fat and fruit pieces were set in six different habitat types within *Parque Nacional Chaco*: gallery forests, hardwood forests or "*Monte Fuerte*" (with the presence of *Schinopsis balansae* and *Aspidosperma quebracho-blanco*), open forests (locally known as "*raleras*"), marshes, flooded grasslands ("*pajonales*"), and secondary grasslands. Bat sampling was conducted during the same period, using two mist nets (7 x 2.5 m; mesh size = 38 mm [19 x 19 mm]) placed 1.2 m above the ground in potential flight corridors, such as forest edges, gallery forests, roads within forests, clear-cut areas, river margins, and lagoons. The total netting effort was calculated following Straube and Bianconi (2002) as the product of the total sampling area (35 m^2, area of each net multiplied by the number of nets), the number of sampling hours per night (5), and the total number of netting nights (7), which amounted to 1,225 m^2.h.

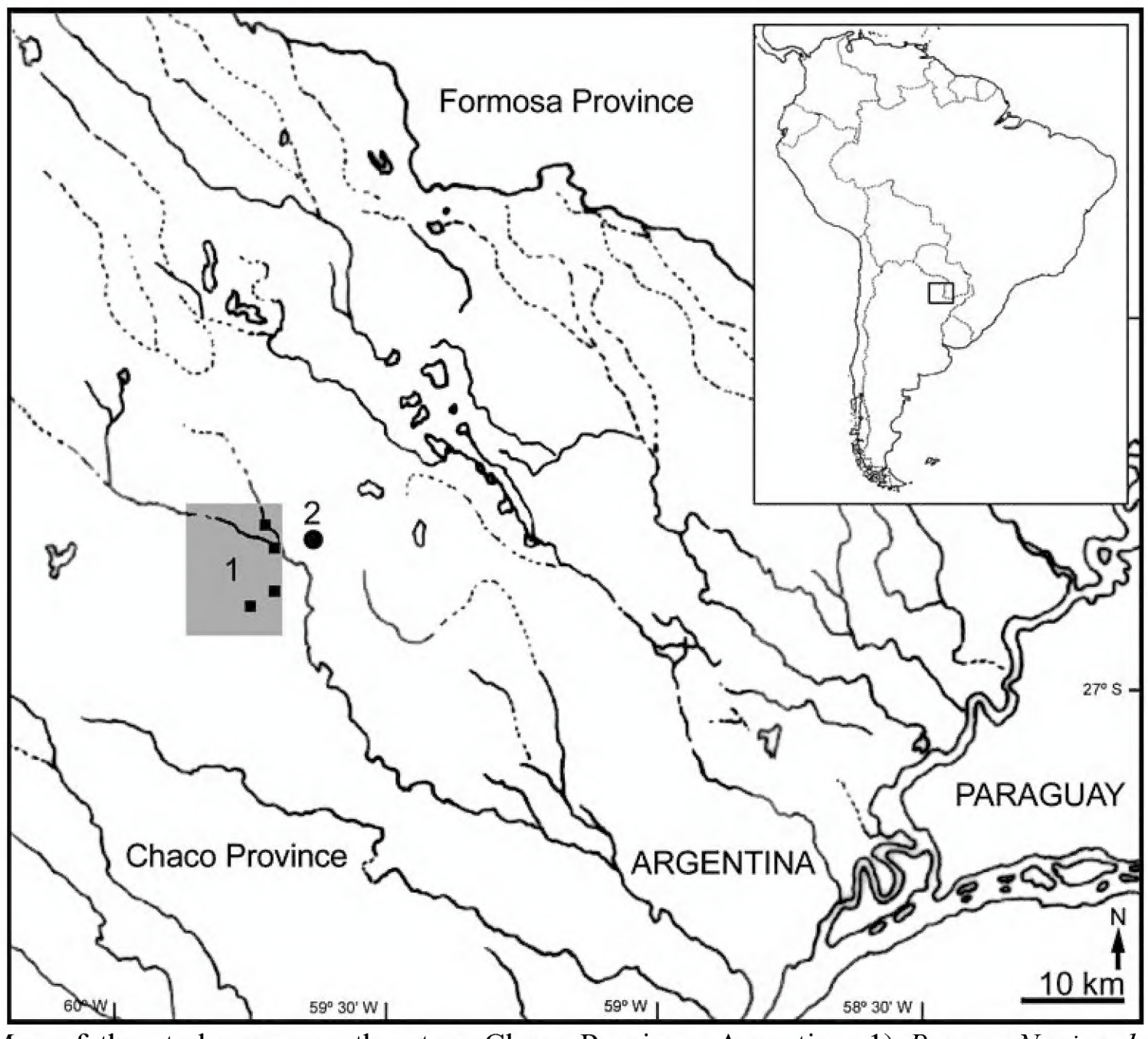

Figure 1. Map of the study area, northeastern Chaco Province, Argentina: 1) *Parque Nacional Chaco* (gray rectangle); 2: Capitán Solari (black dot). Black squares within the park indicate locations sampled with traps and mist nets.

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Rodents and bats were prepared as skin and skull or preserved in alcohol (70 %), and deposited in the mammal collection of the *Museo Argentino de Ciencias Naturales "Bernardino Rivadavia"* (MACN, see Appendix). Trapped individuals were identified to the species by comparison with voucher specimens deposited in collections and also by a literature review (Barquez et al. 1999; Pardiñas and Teta 2006; Voss et al., 2006).

Pellet samples of barn owls (*Tyto alba*) were collected in Capitán Solari. Because of the humid environment, pellets decay rapidly. Therefore, and given that we collected also pellet debris, the precise number of pellets included in this analysis could not be determined. Those materials were collected at the same site (an abandoned water tank) where Massoia et al. (1995) previously studied another pellet sample.

Osteological remains were identified by comparison with the reference collection of MACN and quantified by assuming the minimum number of individuals (MNI): for prey of small mammals, paired cranial elements of each taxon were separated and the largest number of elements from either the left or the right side was quantified. Binomens followed Wilson and Reeder (2005), with modifications according to Cirignoli et al. (2006), Voss et al. (2006), and D'Elía et al. (2008).

Results and discussion

Forty-two individuals from five bat and four sigmodontine rodent species were collected (Table 1). The akodontine rodents *Akodon azarae* Fischer, 1829 and *Necromys lasiurus* (Lund, 1840) were the most abundant species in the sample. Two vespertilionid and three molossid bats were mist-netted; being *Molossus molossus* (Pallas, 1766) the most frequently captured species (Table 1). In addition, we identified MNI of 1,032 prey items in owl pellets, and the most abundant species were the cricetid rodent *Holochilus chacarius* Thomas, 1906, *Calomys callosus* (Rengger, 1830), *Oligoryzomys* sp. 1, and the didelphid marsupial *Cryptonanus chacoensis* (Tate, 1931) (Table 1). Identified taxa included eight other rodent species and one didelphid (Table 1). All small mammals trapped in Parque Nacional Chaco, as well as those found in owl pellets in Capitán Solari, belonged to species that are typical of the Humid Chaco ecoregion, many of them with previous records in the area (cf. Kravetz et al. 1986; Massoia et al. 1995; Barquez et al. 1999). Some relevant records are discussed in the following paragraphs.

The marsupial genus *Cryptonanus* Voss, Lunde et Jansa, 2006 was diagnosed to include several species previously referred to as *Gracilinanus* Gardner et Creighton, 1989. *Cryptonanus chacoensis* was originally described as a subspecies of *Gracilinanus agilis* (Burmeister, 1864), and then considered a separate species by Voss et al. (2006). *Gracilinanus agilis* was reported by Massoia et al. (1995) for Capitan Solari, but the figures presented by them look similar to *Cryptonanus*. We examined several cranial remains from Capitan Solari and found them undistinguishable of *C. chacoensis*. This record extends the known distribution of this species by 90 km to the west (cf. Voss et al. 2006).

The bat *Lasiurus ega* (Gervais, 1856) is widely distributed in north and central Argentina (Barquez et al. 1999), and western and southern Paraguay (López-González, 2005). Our findings, based on two complete skulls recovered from owl pellets, confirm its presence in Chaco Province, where no previous records were made (cf. Barquez et al. 1999). The nearest previous reference corresponds to El Colorado, Formosa Province, ca. 60 km northeast of Capitán Solari.

The rodent *Calomys laucha* (Fischer, 1814) is an uncommon species in the Humid Chaco. Pardiñas and Teta (2005) reported one record for this rodent in Villa Dos Trece, eastern Formosa Province, and suggested that its presence in the Humid Chaco is perhaps the result of a recent expansion event, partially facilitated by human activities, such as agriculture and livestock farming.

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Table 1. Small mammals (Didelphimorphia, Chiroptera, and Rodentia) recorded in *Parque Nacional Chaco* and Capitán Solari, Chaco Province, according to trapping data, owl pellet analysis and literature. References: a: Massoia et al. (1995); b: this work; c: Kravetz et al. (1986); and d: this work.

	Owl pellets		Traps	
	Capitán Solari		P. N. Chaco	
	a	b	c	d
Order Didelphimorphia Gill, 1872				
Family Didelphidae Gray, 1821				
Cryptonanus chacoensis (Tate, 1931)	-	37	-	-
Didelphis albiventris Lund, 1840	-	1	-	-
Lutreolina crassicaudata (Desmarest, 1804)	5	-	-	-
Didelphidae gen. et sp. indet.	19*	-	-	-
Order Chiroptera Blumenbach, 1779				
Family Vespertilionidae Gray, 1821				
Eptesicus furinalis (d'Orbigny, 1847)	-	-	-	1
Lasiurus ega (Gervais, 1856)	-	2	-	-
Myotis nigricans (Schinz, 1821)	-	-	-	3
Family Molossidae Gervais, 1856				
Eumops patagonicus Thomas, 1924	-	-	-	2
Molossops temminckii (Burmeister, 1854)	-	-	-	1
Molossus molossus (Pallas, 1766)	-	-	-	14
Order Rodentia Bowdich, 1821				
Family Cricetidae Rochebrune, 1883				
Akodon azarae (Fischer, 1829)	6	30	4	9
Akodon toba Thomas, 1921	2	-	1	-
Calomys callosus (Rengger, 1830)	-	220	8	3
Calomys laucha (Fischer, 1814)	-	5	-	-
Holochilus brasiliensis (Desmarest, 1819)	-	7	-	-
Holochilus chacarius Thomas, 1906	-	561	3	-
Holochilus spp.	446	-	-	-
Necromys lasiurus (Lund, 1840)	3	18	16	4
Oecomys sp.	-	3	-	-
Oligoryzomys sp. 1	34	86	4	5
Oligoryzomys sp. 2	-	10	-	-
Pseudoryzomys simplex (Winge, 1887)	14	36	-	-
Scapteromys aquaticus Thomas, 1920	-	10	-	-
Family Muridae Illiger, 1811				
Rattus cf. *R. rattus* (Linnaeus, 1758)	-	2	-	-
Family Caviidae Fischer, 1817				
Cavia aperea Erxleben, 1777	5	5	-	-
Total	534	1032	36	42

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Two species of the rodent genus *Holochilus* Brandt, 1865 were found in the sample, *H. brasiliensis* (Desmarest, 1819) and *H. chacarius*. The former has only one previous record in the Humid Chaco (cf. Pardiñas and Teta 2005). However, the generalized absence of *H. brasiliensis* in the eastern portion of Chaco and Formosa provinces is probably related to its natural scarcity in the area and/or possible confusions with the much more abundant *H. chacarius*. In Argentina, both species are sympatric in a large area extending from Corrientes and Formosa provinces to northeastern Buenos Aires Province (Pardiñas et al. 2005; Voglino et al. 2005).

The rodent *Oecomys* sp. is known from only five localities in Chaco and Formosa provinces (Pardiñas and Ramirez-Llorens 2005; Jayat et al. 2006). Our record extends its known distribution by 53 km to the west. The taxonomic status of Chacoan populations, initially referred to *O. concolor roberti* (Thomas, 1903) by Massoia and Fornes (1965), is unclear. Pardiñas and Ramirez-Llorens (2005) suggest that *Oecomys* sp. is morphologically related to the large forms of the genus such as *O. mamorae* (Thomas, 1906) or *O. superans* Thomas, 1911.

Two small (*O. flavescens* (Waterhouse, 1837) and *O. fornesi* (Massoia, 1973), referred to *Oligoryzomys* sp. 1) and two large (*O. chacoensis* (Myers et Carleton, 1983) and *O. nigripes* (Olfers, 1818); *Oligoryzomys* sp. 2), partially synmorphic species of the rodent genus *Oligoryzomys* are found in eastern Chaco Province. Distributional limits of these taxa and areas of sympatry between them are poorly known. Contreras and Rosi (1983) and Kravetz et al. (1986) documented the presence of *O. flavescens* in Capitán Solari and *Parque Nacional Chaco*, respectively. Massoia et al. (1995) referred craniodental remains from owl pellets collected in Capitán Solari to *O. fornesi*. Later, the specimen reported by Contreras and Rosi (1983) was reidentified as *O. fornesi* by Pardiñas and Teta (2005). Clearly, a more integrative approach, combining morphological and molecular data, is needed to clarify the taxonomic status of *Oligoryzomys* in the Humid Chaco.

Despite the records for *Akodon toba* for the study area (Kravetz et al. 1986; Massoia et al. 2005) we did not find it. *Akodon toba* Thomas, 1921 has a fragmented distribution in the Humid Chaco, and is more frequent towards the xerophytic floristic formations of the Dry Chaco (Myers 1991). In adittion, Massoia et al. (1995) reported cranial remains of the didelphid *Lutreolina crassicaudata* (Desmarest, 1804) from Capitán Solari, but this didelphid species was not recorded in our study.

In spite of the briefness of the survey conducted, we found five new species for the area. These are one rare marsupial (*Cryptonanus chacoensis*), three sigmodontine rodents (*Calomys laucha*, *Holochilus brasiliensis*, and *Oecomys* sp.), and one vespertilionid bat (*Lasiurus ega*). Moreover, the bat species is new for the Chaco province. However, according to previous records in other areas of the Humid Chaco and northern Argentina, these presences were not completely unexpected.

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Literature cited

Barquez, R. M., M. A. Mares, and J. K. Braun. 1999. The Bats of Argentina. Special Publications, Museum of Texas Tech University. 275 p.

Barquez, R. M. and R. A. Ojeda. 1992. The bats (Mammalia: Chiroptera) of the Argentine Chaco. Annals of the Carnegie Museum 61(3): 239-261.

Cabrera, A. L. 1976. Regiones fitogeográficas argentinas. Enciclopedia Argentina de Agricultura y Jardinería 1: 1-85.

Cirignoli, S., P. Teta, U.F.J. Pardiñas and G. D'Elía. 2006. Tribu Orizomyini Vorontsov, 1959 (sensu Voss y Carleton, 1993); p. 166-175 *In* R. M. Barquez, M. M. Díaz and R.A. Ojeda (ed.). Mamíferos de Argentina. Sistemática y distribución. Sociedad Argentina para el Estudio de los Mamíferos, Mendoza

Contreras, J. and L. M Berry. 1983. Notas acerca de los roedores del género *Oligoryzomys* de la Provincia del Chaco, República Argentina (Rodentia-Cricetidae). Historia Natural 3(15): 145-148.

D'Elía, G., U. F. J. Pardiñas, J. P. Jayat and J. Salazar-Bravo. 2008. Systematics of *Necromys* (Rodentia, Cricetidae, Sigmodontinae): species limits and groups, with comments on historical biogeography. Journal of Mammalogy 89(3): 778–790.

Galliari, C. A. and F. Goin. 1993. Conservación de la Biodiversidad en la Argentina: el caso de los mamíferos; p. 367-400 *In* F. Goin and R. Goñi (ed.). Elementos de Política Ambiental Honorable Cámara de Diputados de la provincia de Buenos Aires.

Heinonen Fortabat, S. and J. C. Chebez. 1997. Los mamíferos de los Parques Nacionales de la Argentina. Literature of Latin America, Monografía. N. 14. 70 p.

Jayat, J. P., P. E. Ortiz, P. Teta, U. F. J. Pardiñas and G. D'Elía. 2006. Nuevas localidades argentinas para algunos roedores sigmodontinos (Rodentia: Cricetidae). Mastozoología Neotropical 13(1): 51-67.

Kravetz F. O., R. E. Percich, G. A. Zuleta, M. A. Callelo and M. C. Weissembacher. 1986. Distribution of Junin Virus and its reservoirs. A tool for Argentine Hemorragic Fever risk. Evaluation in non-endemic areas. Interciencia 11(4): 185-188.

López-González, C. 2005. Murciélagos del Paraguay. Publicaciones del Comité Español del Programa Hombre y Biosfera-Red IberMaB, UNESCO. Madrid.

Massoia, E. and A. Fornes. 1965. *Oryzomys* (*Oecomys*) Thomas, 1906, nuevo subgénero de cricétidos para la República Argentina (Rodentia). Physis, Buenos Aires, Sección C, 25: 319-324.

Massoia, E., G. Aprile and B. Lartigau. 1995. Vertebrados depredados por *Tyto alba* en Capitán Solari, Partido de Sargento Cabral, provincia del Chaco. Boletín Científico, Asociación para la Protección de la Naturaleza 9(27): 9-14.

Myers, P. 1989. A preliminary revision of the *varius* group of *Akodon* (*A. dayi*, *dolores*, *molinae*, *neocenus*, *simulator*, *toba*, and *varius*); p. 5-54 *In* K. H. Redford and J. F. Eisenberg (ed.). Advances in Neotropical Mammalogy, Sandhill Crane Press, Inc., Gainesville, FL.

Pardiñas, U. F. J., C.A. Galliari and S. Cirignoli. 2004. Distribution of *Pseudoryzomys simplex* (Rodentia: Cricetidae) in Argentina. Mastozoología Neotropical 11(1): 105-108.

Pardiñas, U. F. J. and P. Ramírez-Llorens. 2005. The genus *Oecomys* (Rodentia: Sigmodontinae) in Argentina. Mammalia 69(1): 103-107.

Pardiñas, U. F. J. and P. Teta. 2005. Roedores Sigmodontinos del Chaco Húmedo de Formosa: aspectos taxonómicos y distribución geográfica; p. 501-517 *In* A. G. Di Giacomo, and S. F. Krapovickas (ed.). Historia natural y paisaje de la Reserva El Bagual, Provincia de Formosa, Argentina. Inventario de la fauna de vertebrados y de la flora vascular de un área protegida del Chaco Húmedo. Temas de Naturaleza y Conservación 4. Aves Argentinas/ Asociación Ornitológica del Plata, Buenos Aires.

Pardiñas, U. F. J., P. Teta and S. Heinonen Fortabat. 2005. Diet of Barn Owl (*Tyto alba*) in the Largest Subtropical Wetlands of Argentina and Eastern Paraguay. Journal of Raptor Research 39(1): 65-69.

Straube, F. C. and G. V. Bianconi. 2002. Sobre a grandeza e a unidade utilizada para estimar esforço de captura com utilização de redes-de-neblina. Chiroptera Neotropical 8(1-2): 150–152.

Teta P., U. F. J. Pardiñas and G. D'Elía. 2006. Rediscovery of *Chacodelphys*: a South American marsupial genus previously known from a single specimen.Mammalian Biology 71(5): 309-314.

Voglino, D., U. F. J. Pardiñas and P. Teta. 2005. *Holochilus chacarius chacarius* (Rodentia, Cricetidae) en la provincia de Buenos Aires, Argentina. Mastozoología Neotropical 11(2): 243-247.

Voss, R. S., A. L. Gardner and S. Jansa. 2004. On the relationships of "*Marmosa*" *formosa* Shamel, 1930 (Marsupialia: Didelphidae), a Phylogenetic Puzzle from Chaco of Northern Argentina. American Museum Novitates 3442: 1-18.

Voss, R. S., D. P. Lunde and S. Jansa. 2006. On the contents of *Gracilinanus* Gardner and Creighton, 1989, with the description of a previously unrecognized clade of small didelphid marsupials. American Museum Novitates 3482: 1-34

Wilson, D. E. and D. M. Reeder (ed.). 2005. Mammal Species of the World. Baltimore: Johns Hopkins University Press. 2142 p.

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Akodon azarae: MACN-Ma 22823, 22824, 22827, 22828, 22831; *Calomys callosus*: MACN-Ma 22829, 22832; *Necromys lasiurus*: MACN-Ma 22825, 22833, 22836; *Oligoryzomys* sp: MACN-Ma 22826, 22830, 22834, 22835, 22837; *Eptesicus furinalis*. MACN-Ma 22822; *Eumops patagonicus*. MACN-Ma 22812, 22813; *Molossops temminckii*. MACN-Ma 22820; *Molossus molossus*. MACN-Ma 22803, 22804, 22805, 22806, 22807, 22808, 22809, 22810, 22811, 22814, 22815, 22816, 22817, 22819; *Myotis nigricans*. MACN-Ma 22818, 22821.